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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,418	04/21/2004	Chun-hyuk Lee	04103-P0007A	9093

66837 7590 02/16/2007  
HYUN JONG PARK  
41 WHITE BIRCH ROAD  
REDDING, CT 06896-2209

EXAMINER
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VALENROD, YEVGENY

ART UNIT	PAPER NUMBER
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1621

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/829,418

Applicant(s)

LEE ET AL.

Examiner

Yevgeny Valenrod

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

Claims 12-14 are canceled by applicants' amendment.

Rejection of claim 11 under 35 USC 112 2<sup>nd</sup> paragraph is withdrawn in view of applicants' amendment.

Rejection of claims 1-4 and 6-11 under 35 USC 103 made over Lee et al. in view of Olin et al is maintained.

Rejection of claims 1-2 and 4-11 under 35 USC 103 made over Lee et al. in view of Olin and further view of Garbo is maintained.

Nonstatutory obviousness-type double patenting rejection of claims 1-4 and 6-11 is maintained

Nonstatutory obviousness-type double patenting rejection of claims 1, 2 and 4-11 is maintained.

Text of the maintained rejections is repeated below, followed by examiners reply to applicants' remarks.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (WO 01/49652 A1) in view of Olin et al. (US 2,370,065).

The instant application claims a method for preparing hydrazodicarbonamide. The said method comprises three steps:

Step 1 - Pyrolysis of urea to form biuret and ammonia. Additional limitations to this step are found in claims 2-5 include: temperature in the range of 100 to 300°C (claim 2), removal of ammonia from the reaction system (claim 3), pyrolysis being conducted under reduced pressure or with injection of inert gas (claim 4), a catalyst being employed in the pyrolysis process (claim 5).

Step 2 – Obtaining metal monohalobiuret of formula 2 or 3 (see claim 1). Additional limitation to step two include: 1 : 0.1 – 1 : 2 mole ration of biuret and metal hypohalogen (claim 6), either metal hydroxide followed by halogen or gaseous halogen used in the reaction (claim 7), reaction being conducted at a temperature below 60°C (claim 8).

Step 3 – Reacting monohalobiuret salt with ammonia. Additional limitation of step 3 include: Ammonia used is liquid, gas, or ammonium hydrate (claim 9), temperature for step 3 being 0 - 150°C.

Additional limitation of Claim 11 includes use of a solvent or mixture of solvents as listed in claim 11.

*Scope of prior art*

Lee et al. teach steps 2 and 3 and (as specified above) of the instantly claimed invention.

Step 2 is described on page 6, line 10 through page 7, line 21. The description includes 3 ways of practicing step 2 which include using halogen gas (page 7, Reaction 10 and lines 4-10), metal hypohalogen (page 6, reactions 8 and 9, lines 12-23) and metal hydroxide followed by halogen gas (17 -21). The temperature of the process is within the range of  $-5$  to  $30^{\circ}\text{C}$ , which is below  $60^{\circ}\text{C}$  (page 7, line 21) (claim 8). The ratio of metal hypohalogen to biuret is 0.1 : 1 to 2 : 1 (page 6 lines 24-25) (claim 6).

Step 3 is described on page 4, line 12 through page 5, line 26. Ammonia can be liquid, gaseous, or ammonia water (page 5 lines 4-7) (claim 9). Solvent and solvent mixtures include water and its mixture with methanol, propanol, ethanol, DMF... (Page 5, lines 11-17) (Claim 11). The temperature at which the reaction is carried out is 30 to  $150^{\circ}\text{C}$  (page 5 lines 2-3) (claim 10).

*Ascertaining the difference between prior art and the instantly claimed invention*

Lee et al. teach steps 2 and 3 of the instant invention. However they don't teach how the biuret required for step 2 is obtained. The said process constitutes step 1 of the instant invention.

*Secondary reference*

Olin et al. teach a method producing the biuret via urea pyrolysis. Olin et al. recite removing the ammonia from the process by using an inert gas (column 2, lines 2-

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12) (limitations of claims 3 and 4). They also teach performing the pyrolysis at a temperature range of 130 to 200<sup>0</sup>C (column 1, line11) (limitation of claim 2).

*Motivation to combine*

One wishing to practice the invention of Lee et al. would invariably need a method of obtaining the biuret starting material. Olin et al. teach the method of producing biuret and the said method has advantages over other known methods, advantages such as avoiding the difficulties of removing ammonia from the reaction process. One of ordinary skill in the art would be motivated to combine, with reasonable expectation of success, the process of making biuret as taught by Olin et al. with the method of using a biuret to prepare hydrazodicarbonamide as taught by Lee et al.

Claims 1-2 and 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. as applied to claims 1-4 and 6-11 above, and further in view of Garbo (US 2,524,049)

*Ascertaining the difference between prior art and instant claims*

Lee et al. teach a method of producing hydrazodicarbonamide from biuret (see details above). Lee et al. do not teach the method of producing the biuret.

*Secondary Reference*

Garbo teaches a method of producing biuret via urea pyrolysis. Garbo further teaches that the production of biuret is benefited by introduction of a catalyst or catalysts. Catalysts that were efficient in improving the yield of biuret production are discussed in column 1, lines 28-53 and include acids (tungstic acid, line37) and

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phosphorus compounds (lines 42-44). Gorbo also teaches a temperature range for the pyrolysis being 140-200°C (column 2, line 6), and performing the reaction under reduced pressure (column 2, line 43-44).

*Motivation to combine*

A person of ordinary skill in the art wishing to prepare hydrazodicarbonamide would be motivated to combine, with reasonable expectation of success, the teachings of Lee et al. and Garbo. The method of preparing a biuret taught by Garbo has advantages over other known similar processes, such as performing the reaction at reduced pressure (column 2, line 46-47). Combining Lee et al. and Garbo teaches all the limitations of the instant claim 1, 2 and 4-11.

***Double Patenting***

Claims 1-4, 6-11 rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8, 10 and 11 of U.S. Patent No. 6,635,785 in view of Olin et al. (US 2,370,065).

The instant application claims a method for preparing hydrazodicarbonamide. The said method comprises three steps:

Step 1 - Pyrolysis of urea to form biuret and ammonia. Additional limitations to this step are found in claims 2-5 include: temperature in the range of 100 to 300°C (claim 2), removal of ammonia from the reaction system (claim 3), pyrolysis being conducted under reduced pressure or with injection of inert gas (claim 4), a catalyst being employed in the pyrolysis process (claim 5).

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Step 2 – Obtaining metal monohalobiuret of formula 2 or 3 (see claim 1).

Additional limitation to step two include: 1 : 0.1 – 1 : 2 mole ration of biuret and metal hypohalogen (claim 6), either metal hydroxide followed by halogen or gaseous halogen used in the reaction (claim 7), reaction being conducted at a temperature below 60<sup>0</sup>C (claim 8).

Step 3 – Reacting monohalobiuret salt with ammonia. Additional limitation of step 3 include: Ammonia used is liquid, gas, or ammonium hydrate (claim 9), temperature for step 3 being 0 - 150<sup>0</sup>C. Additional limitation of Claim 11 includes use of a solvent or mixture of solvents as listed in claim 11.

*Primary Reference*

6,635,785 teaches Steps 2 and 3 (instant claim 1) and the subsequent limitation of steps 2 and 3, which are found in claims 6-11 of the instant application.

Step 2 and its limitation are found in claims 2, 3, 4 and 5 of 6,635,785. Claims 2 and 4 teach the limitation of the instant claim 7, claim 3 teaches the limitation of the instant claim 6 (reagent ratio) and claims 5 and 7 teach the limitation of the instant claim 8 (Temperature for the process).

Step 3 and its limitations are found in claims 1, 8, 10 and 11 of 6,635,785. Claim 1 teaches the reaction of Step 3, claim 8 teaches the limitation of the instant claim 9 (ammonia can be liquid, gaseous or ammonium hydroxide), claim, claim 10 teaches the limitation of the instant claim 10 (temperature for reaction 30-150<sup>0</sup>C), claim 11 teaches the limitation of the instant claim 11 (solvent is water).



*Ascertaining the difference between 6,635,785 and the instant claims*

Although the claims of 6,635,785 teach the process of steps 2 and 3 (steps are as defined above) of the instant application, it does not teach step 1, pyrolysis of urea to produce biuret. Claims 2-5 of the instant application are directed to the pyrolysis of urea. Claims 2-4 are taught by the secondary reference.

*Secondary reference*

Olin et al. teach a method producing the biuret via urea pyrolysis. Olin et al. recite removing the ammonia from the process by using an inert gas (column 2, lines 2-12) (limitations of claims 3 and 4). They also teach performing the pyrolysis at a temperature range of 130 to 200°C (column 1, line 11) (limitation of claim 2).

*Motivation to combine*

Olin et al. teach the method of producing biuret and the said method has advantages over other known methods, advantages such as avoiding the difficulties of removing ammonia from the reaction process. One of ordinary skill in the art would be motivated to combine, with reasonable expectation of success, the process of making biuret as taught by Olin et al. with the method of using a biuret to prepare hydrazodicarbonamide as claimed in the U.S. Patent No. 6,635,785.

Claims 1, 2, 4-11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8, 10 and 11 of U.S. Patent No. 6,635,785 further in view of Garbo (US 2,524,049).

*Ascertaining the difference between 6,635,785 and the instant claims*

Although the claims of 6,635,785 teach the process of steps 2 and 3 (steps are as defined above) of the instant application, it does not teach step 1, pyrolysis of urea to produce biuret. Claims 2-5 of the instant application are directed to the pyrolysis of urea. Claims 2, 4 and 5 are taught by the secondary reference.

*Secondary Reference*

Garbo teaches a method of producing biuret via urea pyrolysis. Garbo further teaches that the production of biuret is benefited by introduction of a catalyst or catalysts. Catalysts that were efficient in improving the yield of biuret production are discussed in column 1, lines 28-53 and include acids (tungstic acid, line 37) and phosphorus compounds (lines 42-44) (instant claim 5). Garbo also teaches a temperature range for the pyrolysis being 140-200°C (column 2, line 6) (instant claim 2), and performing the reaction under reduced pressure (column 2, line 43-44) (instant claim 4).

*Motivation to combine*

A person of ordinary skill in the art wishing to prepare hydrazodicarbonamide would find it obvious to combine, with reasonable expectation of success, the method described in U.S. Patent No. 6,635,785 and the process taught by Garbo. The method of preparing a biuret taught by Garbo has advantages over other known similar processes, such as performing the reaction at reduced pressure (column 2, line 46-47). Combining Garbo with the claims of 6,635,785 teaches all the limitations of the instant claims 1, 2 and 4-11.

***Examiners' response to Applicants' remarks***

Applicant argues that the present invention requires recycling of ammonia recovered from the pyrolysis process of step 1. This argument is not found persuasive:

Olin teaches removal of ammonia using in a current of gas (column 2, lines 3-9). He further teaches using a gas that can be separated from the ammonia after the ammonia is removed from the pyrolysis process (column 2, lines 23-26). Applicant also teaches removal of the ammonia from the pyrolysis process. The source of ammonia for the reaction with monohaloburet (step 3 of the claimed process) does not render the claim patentable. Ammonia purchased from a chemical manufacturer and ammonia obtained from the pyrolysis is the same chemical, ammonia. One of ordinary skill in the art would be motivated to use the ammonia recovered from pyrolysis process because doing so offers a financial benefit of not having to buy the chemical that is already in one's possession. In addition, Lee only requires a supply of ammonia for the step described on page 4 line 12 through page 5 line 26. Lee provides no evidence that one source or form of ammonia is preferred over another (page 5 lines 4-7).

Applicant also argues that the amendment to claim 4 which limits the claim to use of inert gas in the pyrolysis process overcomes the art rejection because it is contrary to the teachings of Olin (Olin teaches toluene and naphthalene) and Garbo (Garbo

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teaches naphthalene, kerosene etc.). This argument is not found persuasive for a number of reasons:

- 1) On page 8, lines 17-19 of the specification filed on 4/21/04 Applicant states :” In addition, liquid phase organic compound which can be changed to the inert gas in the reactor of high temperature can be used as the inert gas source”. Applicant therefore includes naphthalene as a possible source of the inert gas.
- 2) Olin writes with regard to the gas for removal of ammonia: “It is desirable that a substance be employed to assist in this removal which is different from the products of the reaction and inert to them” (column 2 lines 9-12). He also writes: “it has been found that the best substances for accomplishing these results are vapors of hydrocarbons, toluene and naphtha being especially well suited to this purpose” (column 2, lines 35-39). It is clear from Olins’ description that inert gasses are preferred and that naphtha and toluene are inert gases suitable for the pyrolysis process.

Applicant also argues that the amendment to claim 5, which limits the catalysts used in the pyrolysis to inorganic acids overcomes the art rejection. This argument is not found persuasive.

It is true that Olin does not disclose use of catalysts for the pyrolysis process. Garbo, on the other hand, does disclose use of catalysts. On page 9, lines 7-8 of applicants’

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remarks, applicant' states: "... Garbo suggests catalysts such as ammonium vanadate, bismuth sulfate, arsenious oxide, tungstic acid...". Tungstic acid is an inorganic acid and therefore meets the limitation of the amended claim 5.

Same arguments as made above apply to the nonstatutory obviousness-type double patenting rejection.

### ***Conclusion***

Claims 1-11 are pending

Claims 1-11 are rejected.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yevgeny Valenrod whose telephone number is 571-272-9049. The examiner can normally be reached on 8:30am-5:00pm M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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Yevgeny Valenrod  
Patent Examiner  
Technology Center 1600



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Thurman Page  
Supervisory Patent Examiner  
Technology Center 1600